

REMARKS

Claims 1-26 are currently pending in this application, as amended. Claims 1 and 14 have been amended to clarify that the oxide lining the trenches is controlled to a thickness ob between about 100 Angstroms to 10,000 Angstroms. Support for this amendment can be found, for example, at least in the original Specification at page 13, lines 8-13. Accordingly, no new matter has been added, and entry of the amendment is respectfully requested.

Claim Rejections Under 35 U.S.C. § 103(a)

Claims 1-26 were rejected under 35 U.S.C. § 103(a) as being obvious over U.S. Patent Application Publication No. 2006/0205174 (Hshieh) in view of U.S. Patent Application Publication No. 2006/0124964 (Geiss). Applicant respectfully requests withdrawal of the rejection of claims 1-26, for at least the following reasons.

Claims 1 and 14, as amended, are directed to a method of manufacturing a semiconductor device. The method includes forming trenches and mesas in a semiconductor substrate, and doping sidewalls of at least one mesa, and further includes, *inter alia*, as follows (emphasis added):

after the doping of the first and second sidewall surfaces of the at least one mesa is completed, lining at least the trenches adjacent to the at least one mesa with an oxide material to a thickness of between about 100 Angstroms to 10,000 Angstroms

Neither Hshieh nor Geiss discloses lining the trenches adjacent to the mesa with an oxide material to a thickness of 100-10,000 Angstroms. Hshieh discloses a thin oxide layer 6 that is deposited prior to doping of the sidewalls of each trench 9. (See e.g., paragraphs [0068]-[0075]). Subsequent to sidewall doping, a thin silicon nitride layer 133 is deposited over the thin oxide layer 6. Hshieh provides no guidelines as to the thickness of the silicon nitride layer 133.

The Examiner contends that Geiss teaches the interchangeability of nitride and oxide, and that therefore one of ordinary skill in the art would have substituted an oxide material for the silicon nitride layer 133 of Hshieh. Applicant respectfully disagrees that nitride and oxide are always interchangeable within the context of a particular semiconductor device. However, Geiss

also fails to disclose the thickness of the oxide liner material. Thus, neither reference discloses the particular thickness of the oxide layer described by claims 1 and 14 of the present application.

Moreover, controlling the thickness of the oxide layer to between 100-10,000 Angstroms is an important consideration when forming the device of claims 1 and 14. Providing the oxide layer within the claimed range offers the advantage of capacitance control within the superjunction structure. This capacitance control allows the user to maintain the properties of the superjunction device and minimize voltage loss at the trenches. (See attached Declaration of Samuel Anderson under 37 C.F.R. § 1.132 at ¶ 4).

Accordingly, since neither reference discloses lining the trenches adjacent to the mesa with an oxide material to a thickness in the non-trivial range of 100-10,000 Angstroms, Hshieh and Geiss taken together cannot render claims 1 or 14 obvious. *See e.g., In re Royka*, 490 F.2d 981, 985 (C.C.P.A. 1974) (when combining two or more references to establish a *prima facie* case of obviousness, the references together must teach, suggest, or disclose all of the claim limitations). Further, since the claimed range provides a significant advantage over other oxide thicknesses, the range is more than an obvious modification. Applicant therefore respectfully requests withdrawal of the rejection of claims 1 and 14 over Hshieh and Geiss.

Claims 2-13 are dependent on claim 1. Claims 15-26 are dependent upon claim 14. Applicant respectfully requests that the rejection of claims 2-13 and 15-26 be withdrawn, due at least to their dependence on claims 1 and 14, respectively.

CONCLUSION

In view of the foregoing Amendment and Remarks, Applicant respectfully submits that the present application, including claims 1-26, is in condition for allowance, and such action is respectfully requested.

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Respectfully submitted,

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